Calculation Policy

Date: March 2026

Next Review Date: March 2028

Signed on behalf of Governing Body:

Calculation policy

The following calculation policy has been devised to meet requirements of the National Curriculum 2014 for the teaching and learning of mathematics and is also designed to give pupils a consistent and smooth progression of learning in calculations across our school.

Intent

Maths is a subject and skill fundamental to children's future success, regardless of background, starting point or future ambition. Our intent is to develop children's ability to solve problems, to reason, to think logically and to work systematically and accurately. We aim for our children to become confident mathematicians who aren't afraid to ask questions and take risks. To do this we strive to provide our children with a high-quality curriculum that is challenging, rich in context and enjoyable, and which builds on children's knowledge and understanding from the end of KS1 through to the end of KS2.

Through following the National Curriculum, we aim to ensure that all pupils:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Implementation

Our curriculum is coherently planned, and lessons follow the small steps outlined by the White Rose Maths Hub and the programme of study outlined in the 2014 National Curriculum. Teachers follow the sequence of small steps so that they are taught in an order that makes sense and is relevant to the children they teach.

Lessons incorporate a Concrete, Pictorial and Abstract (CPA) approach to model and support children's understanding of mathematical processes. High quality resources are used to scaffold learning for all children, this includes reasoning and problem-solving questions which extend learning and give pupils opportunity to apply their understanding in a variety of different contexts. Pupils are also given ample time to master concepts through additional practice, focus groups and questioning.

The teaching of maths considers the entire class through rigorous planning and assessment. Retrieval activities are also used to revisit previous learning and ensure Maths skills are embedded. Homework is set to revisit and consolidate prior learning. Where possible, meaningful links are made with other areas of the curriculum.

Maths lessons take place each day, lasting for approximately 1 hour. Whole class teaching is used with individuals and groups being supported within the lesson as required. In the upper school, classes are set by confidence in order to scaffold and master key concepts in both groups more effectively. Children identified as needing additional support at various times of the year are placed in booster or tuition groups which take place outside of daily maths lessons.

Our calculation policy is used to ensure a coherent and consistent approach to teaching the four operations across the school. With the consultation of staff through the school, this policy has been created using a stages approach to support individual ability and progression through learning.

As children are expected to know all multiplication facts up to 12 x 12 by the summer term of Year 4 so that they can take the National Multiplication Tables Check (MTC), times tables are taught regularly using a progressive approach. In Year 3, children begin by recapping facts learnt in Year 2, reinforcing the 2s, 5s and 10s times tables, before moving on to the 4s and 8s, and the 3s and 6s. In Year 4, they rehearse those learnt previously before moving on to the 12s, 7s, 9s and 11s. Children are encouraged to use the skills of doubling, halving and the commutative properties of multiplication i.e. 2 x 3 = 6 therefore 3 x 2 = 6.

Problem solving

Where possible, teachers ensure that pupils have the opportunity to apply their knowledge in a variety of contexts and real-life problems (including through exploration of cross-curricular links) to deepen their understanding in every lesson.

Choosing a calculation method:

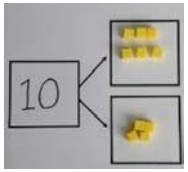
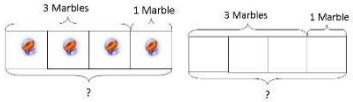
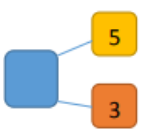
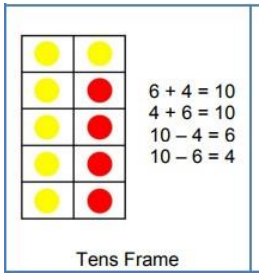
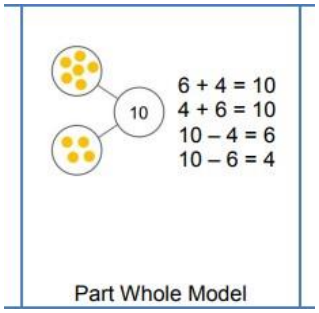
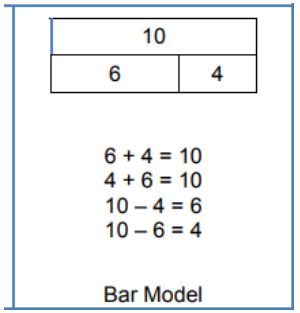
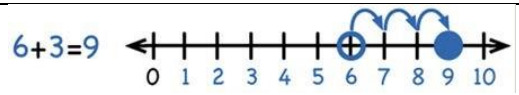
Step 1: Can I do it in my head using a mental strategy?

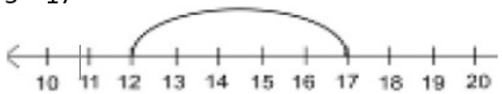
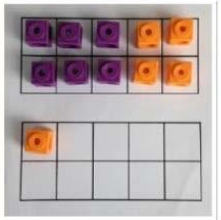
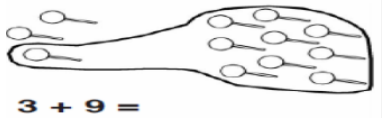
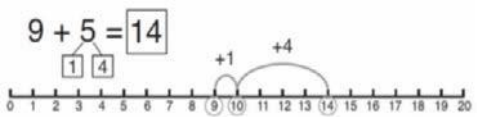
Step 2: Could I use some jottings to help me?

Step 3: Should I use a written method to work it out?

Below are the methods in which pupils are taught the concepts of addition, subtraction, multiplication and division.

Addition - Working at KS1 standards - Stage 1

Objective and Strategy	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part- whole model	 Use cubes to add two numbers together as a group or in a bar. (Some children may still need to use real objects)  Use part-part whole model	 Use pictures to add two numbers together as a group or in a bar.  The Bar Model will be used as a method to support problem solving involving addition, continuing with the concrete representations and moving onto using pictorial representations of objects. Some children will also move onto the abstract.  Pictorial (concrete) Abstract	 Use the part-part whole diagram as shown above to move into the abstract. **4 + 3 = 7** **10= 6 + 4**
Represent and use number bonds and related subtraction facts within 20	 (Some children may need to initially use real objects then move onto the representation, egg boxes may also be used to support this)		 Bar model and part-part whole to be used alongside abstract
Addition and subtraction of one-digit and two-digit numbers to 20 including 0.		 Start at the larger number on the number line and count on in ones.	5 + 12 = 17 17= 12 + 5

Start at the bigger number and counting on	Start with the larger number on the bead string and then count of to the smaller number 1 by 1 to find the answer.	12 + 5 = 17  Start at the larger number on the number line and count on in ones or in one jump to find the answer.	Place the larger number in your head and count on the smaller number to find your answer.
Regrouping to make 10 (The 'Make 10' strategy)	 6 + 5 = 11  Start with the bigger number and use the smaller number to make 10. Use ten frames.	 Use pictures or a number line. Regroup or Partition the smaller number using the part part whole model to make 10.  	7 + 4= 11 If I am at seven, how many more do I need to make 10. How many more do I add on now?
Vocabulary	add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, balancing, part, part, whole		

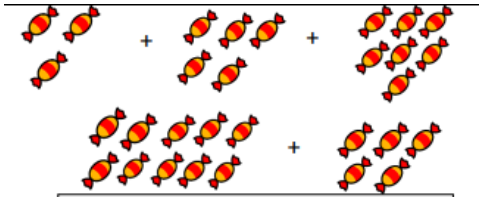
Addition - Working at KS1 standards - Stage 2

Adding 3 1-digit numbers

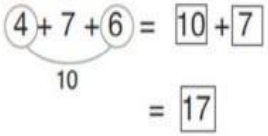
4 + 7 + 6= 17

Put 4 and 6 together to make 10. Add on 7.

Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit.

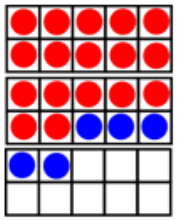


Add together three groups of objects. Draw a picture to recombine the groups to make 10.



Combine the two numbers that make 10 and then add on the remainder.

Adding a 2-digit number and ones



17 + 5 = 22

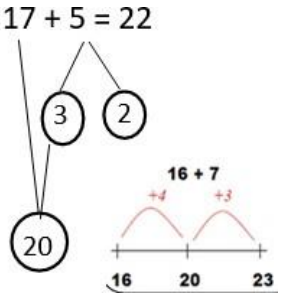
Use ten frame to make 'magic ten

Children explore the pattern.

17 + 5 = 22

27 + 5 = 32

Use part part whole and number line to model.



Bar Model

17 + 5 = 22

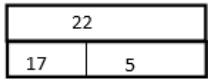
Explore related facts

17 + 5 = 22

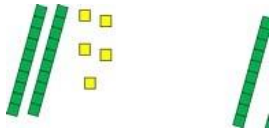
5 + 17 = 22

22—17 = 5

22—5 = 17

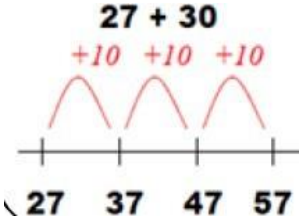


Adding a 2-digit number and multiples of 10



25 + 10 = 35

Explore that the ones digit does not change



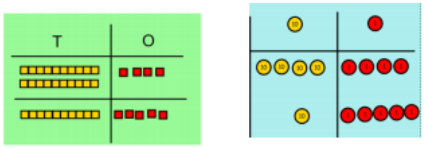
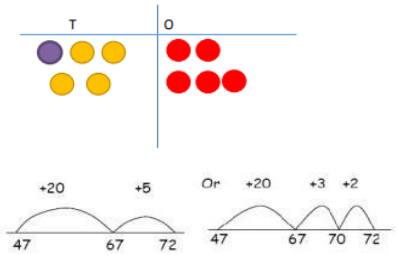
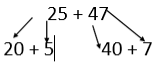
Base 10 may be used above the number line initially.

The calculation will be shown alongside the number line to see the connection

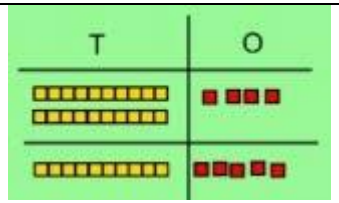
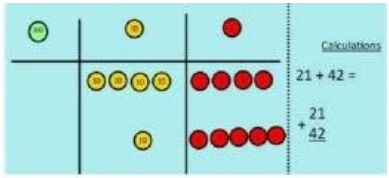
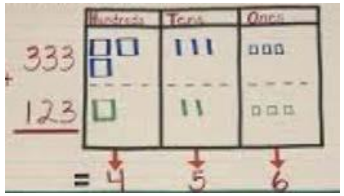
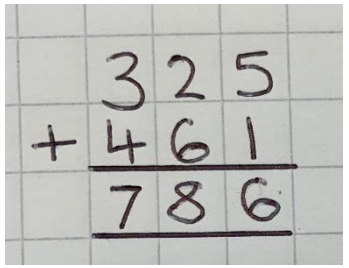
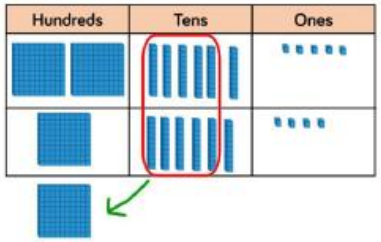
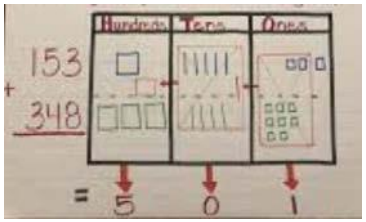
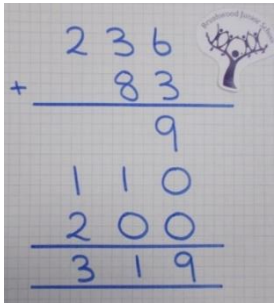
27 + 10 = 37

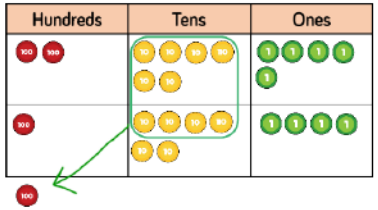
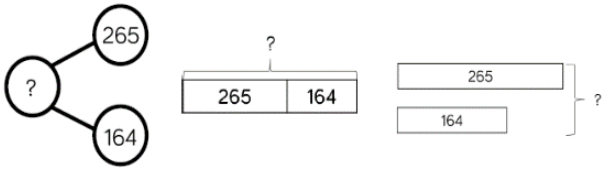
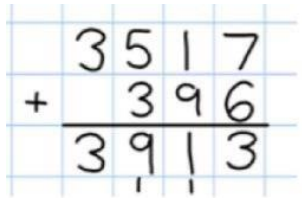
27 + 20 = 47

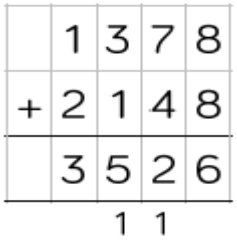
27 + □ = 57

Adding two 2-digit numbers (no exchanging)	**24 + 15=** Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters.  (Some children may not be ready for place value counters in Y2) Numicon may also be used 	After practically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions.  Use number line and bridge ten using part whole if necessary. Base 10 may be used above the number line. The calculation will be shown alongside the number line to see the connection <u>The Bar Model</u> will be used to support problem solving moving onto the generalisation that b+c=a. Children will focus on using the abstract representation with the pictorial to support where necessary.	Partitioning:  20 + 40 = 60 5+ 7 =12 60 + 12 = 72 *Recording addition in columns supports place value and prepares for formal written methods with larger numbers.* Toward the end of the year, children move to more formal recording using partitioning method: 40 + 7 30 + 5 70 + 12
Vocabulary	add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary		

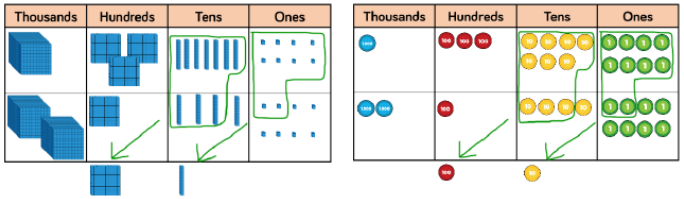
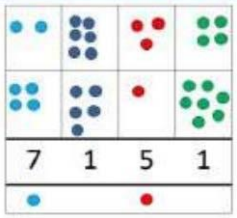
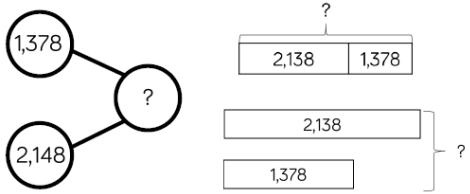
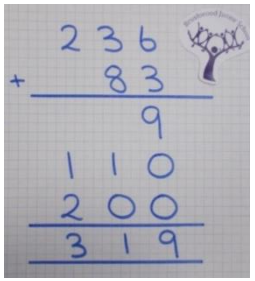
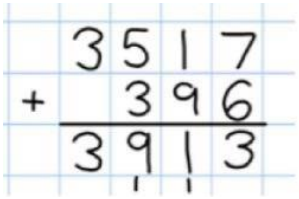
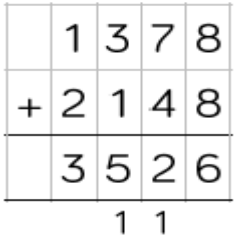
Addition - Stage 3

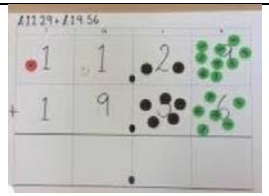
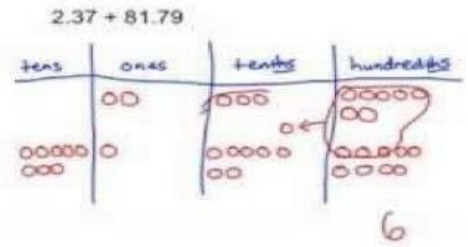
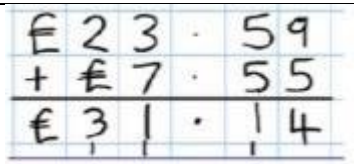
Objective and Strategy	Concrete	Pictorial	Abstract
Add and subtract numbers with up to 3-digits, using formal written methods of columnar addition **Column addition (no exchanging)**	 Using manipulatives (dienes, numicon, counters), children are to line up hundreds, tens and ones. Children should be secure with using PV counters before moving onto pictorial.  The calculation will be shown alongside the model used to see the connection **Model** | **Calculation**	 Children are to draw, in a PV frame, the manipulatives, that they are using. Secure knowledge of representation with the PV columns. The calculation will be shown alongside the model to see the connection **Model** | **Calculation**	When children have secured their understanding of place value through addition, they will begin to explore the short column method alongside the pictorial examples. 
Column addition (with exchanging) When children can use column addition without exchanging, they will begin to explore exchanging.		 Children can draw a representation of the grid to further support their understanding, carrying the ten ***underneath*** the line.	Children may begin to explore the expanded column method for exchanging if they need to deepen their understanding of this concept. 

<table>
<tr>
<td></td>
<td> 
</td>
<td> 
</td>
<td>If children have a good grasp of exchanging, they may move straight to the short column method for addition.
 

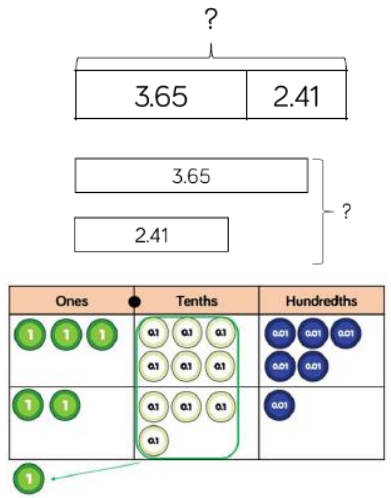
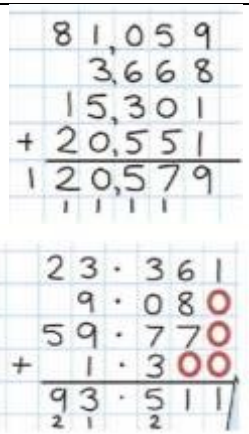
When exchanging into another column, children are taught to carry the ten underneath.
 
</td>
</tr>
<tr>
<td>Vocabulary</td>
<td colspan="3">addition add, more, and make, sum, total, altogether, double, near double, half, halve, tens boundary, hundreds boundary, exchange, carry</td>
</tr>
</table>

Addition - Stage 4

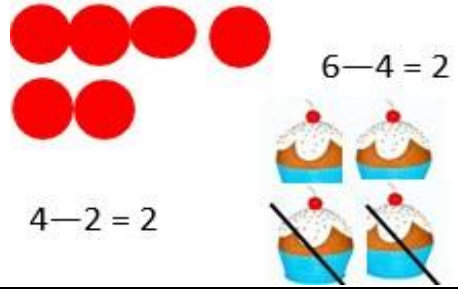
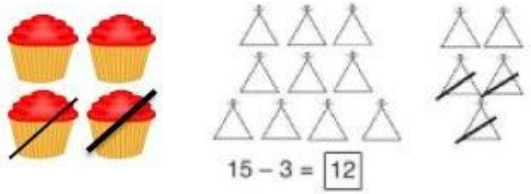
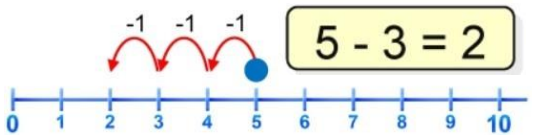
Objective and Strategy	Concrete	Pictorial	Abstract
Using formal written methods of columnar addition where appropriate **Add numbers with up to 4 digits (with exchanging)**	Children continue to use dienes or place value counters to add, exchanging ten ones for a ten and ten tens for a hundred and ten hundreds for a thousand.   The calculation will be shown alongside the manipulative used to see the connection **Model** | Calculation	 Children can draw a pictorial representation of the columns and place value counters to further support their learning and understanding.  	The expanded column method may still be used for children who do not have a full grasp of place value and/or exchanging.  Otherwise, they will continue to rehearse the short column method.  

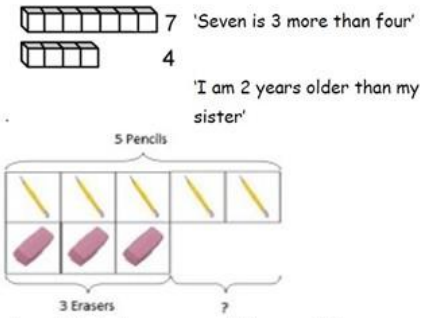
Add decimals with 2 decimal places, including money.	 Introduce decimal place value counters and model exchange for addition.		 As the children move on, introduce decimals with the same number of decimal places and different. Money can be used here.
Vocabulary	addition add, more, and make, sum, total, altogether, double, near double, half, halve, tens boundary, hundreds boundary, decimal, decimal point		

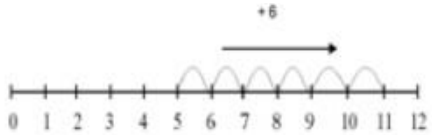
Addition - Stage 5

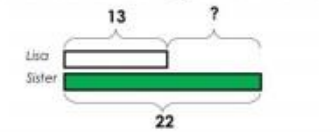
Objective and Strategy	Concrete	Pictorial	Abstract
Add numbers with more than 4 digits.	See Year 4 **At this stage, children will spend a short time exploring the concrete and pictorial representations, and will spend more time mastering the abstract method using larger numbers.**		 Children should have abstract supported by a pictorial or concrete if needed.
Add several numbers of increasing complexity, including adding money, measure and decimals with different numbers of decimal points.	See Year 4 **At this stage, children will spend a short time exploring the concrete and pictorial representations, and will spend more time mastering the abstract method using larger numbers.**		 Insert zeros for place holders.
Vocabulary	addition add, more, and make, sum, total, altogether, double, near double, half, halve, tens boundary, hundreds boundary, decimal, decimal point		

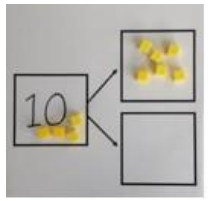
Subtraction - Working at KS1 standards - Stage 1

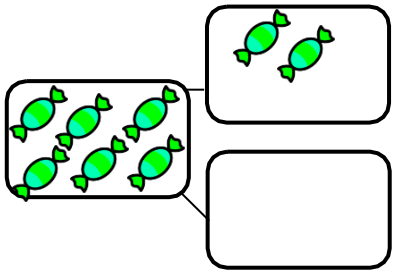
Objective and Strategy	Concrete	Pictorial	Abstract
Subtract one-digit and two-digit numbers to 20, including 0. **Taking away ones**	Use physical objects, counters, cubes etc to show how objects can be taken away.  	Cross out drawn objects to show what has been taken away.  	7—4 = 3 16—9 = 7
Counting back	Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones. **13 – 4**  Use counters and move them away from the group as you take ther away counting backwards as you go. 	 Count back on a number line or track Start at the bigger number and count back the smaller number showing the jumps on the number line.	Put 13 in your head, count back 4. What number are you at? (Use your fingers to help you)

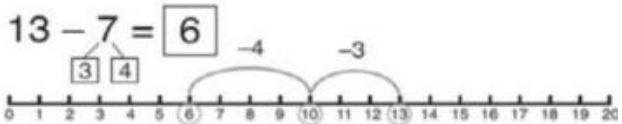
<table>
<tr>
<td>Find the difference</td>
<td>Compare objects and amounts
 

Lay objects to represent bar model.</td>
<td> 

Count on to find the difference.
Comparison Bar Models
Draw bars to find the difference between 2 numbers.
 
</td>
<td>Hannah has 12 sweets and her sister has 5. How many more does Hannah have than her sister?</td>
</tr>
<tr>
<td>Represent and use number bonds and related subtraction facts within 20

Part-part whole model</td>
<td> 

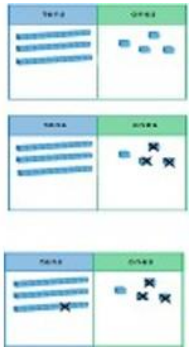
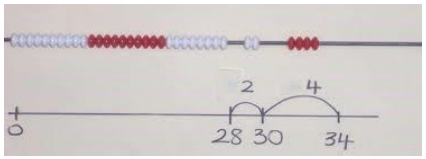
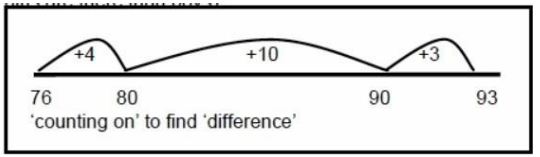
Link to addition. Use PPW model to model the inverse.
If 10 is the whole and 6 is one of the arts, what s the other part?
10—6 = 4</td>
<td> 
Use a pictorial representation of objects to show the part-part whole model</td>
<td> 

Move to using numbers within the part whole model.</td>
</tr>
<tr>
<td>Make 10</td>
<td>14 – 9 =
 
Make 14 on the ten frame. Take away the four first to make 10 and then takeaway one more so you have taken away 5. You are left with the answer of 9.</td>
<td> 

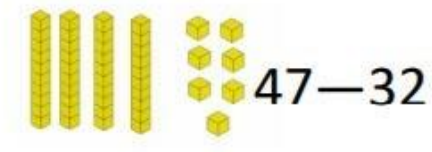
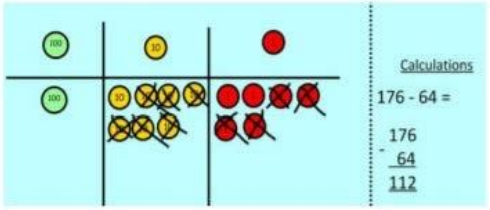
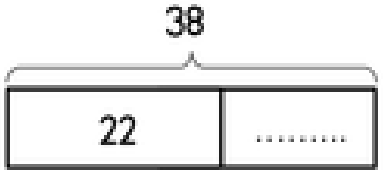
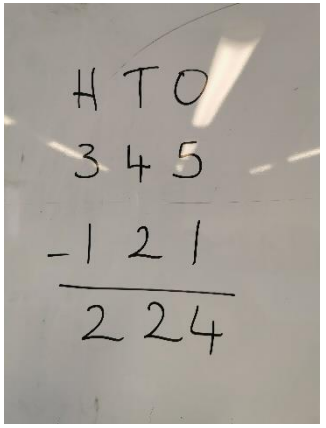
Start at 13. Take away 3 to reach 10. Then take away the remaining 4 so you have taken away 7 altogether. You have reached your answer.</td>
<td>16 – 8=

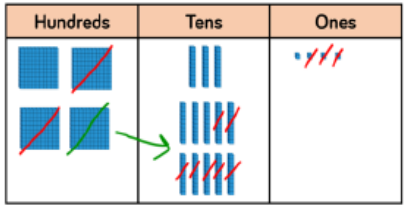
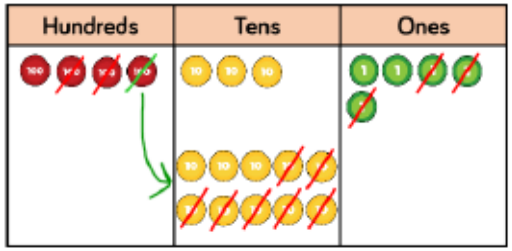
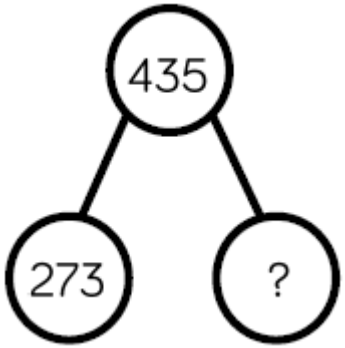
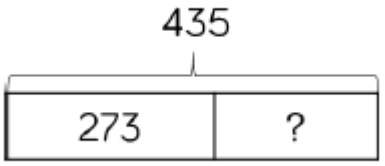
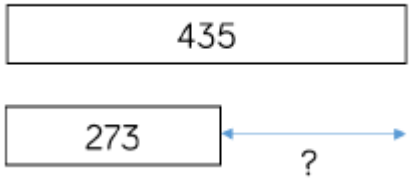
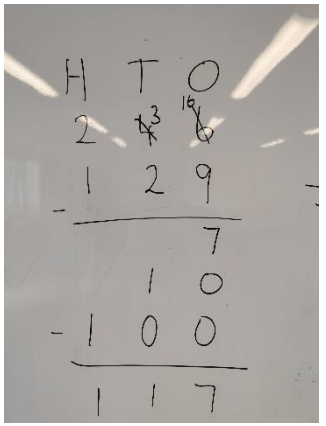
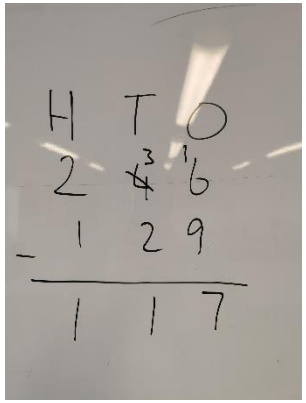
How many do we take off to reach the next 10?
How many do we have left to take off?</td>
</tr>
<tr>
<td>Vocabulary</td>
<td colspan="3">equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is…</td>
</tr>
</table>

Subtraction - Working at KS1 standards - Stage 2

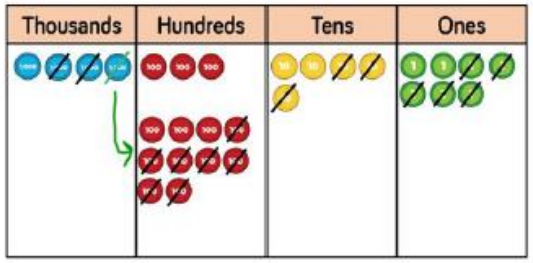
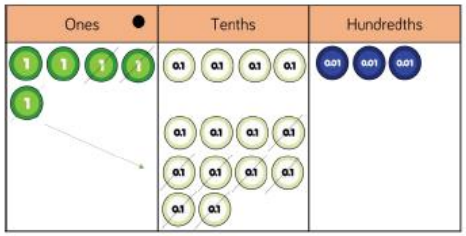
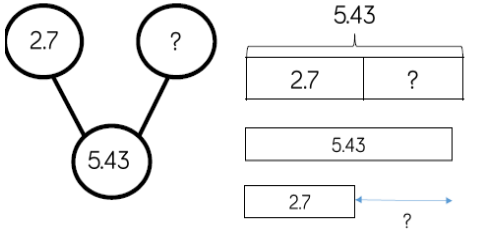
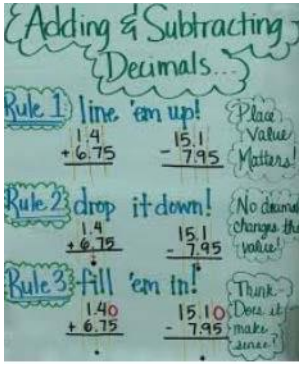
Objective and Strategy	Concrete	Pictorial	Abstract
Subtract a two-digit number and ones, a two-digit number and tens, two two-digit numbers Partitioning to subtract without regrouping: 'friendly numbers'	34—13 = 21  Use Dienes to show how to partition the number when subtracting without regrouping. The calculation will be shown alongside the manipulative used **Model** | **Calculation**	Children draw representations of Dienes and cross off.  43—21 = 22	43—21 = 22 *Recording subtraction in columns supports place value and prepares for formal written methods with larger numbers.* Toward the end of the year, children move to more formal recording using partitioning method: e.g. 43-21=22 40 and 3 -20 and 1 20 and 2
Make ten strategy	 34—28 Use a bead bar or bead strings to model counting to next ten and the rest.	 Use a number line to count on to next ten and then the rest.	93—76 = 17
Vocabulary	equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is…difference, count on, strategy, partition,		

Subtraction - Stage 3

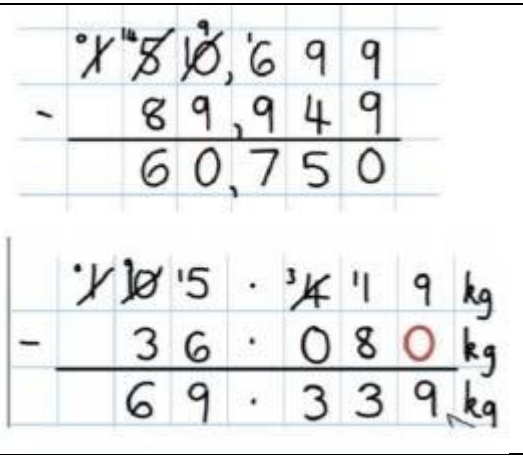
Objective and Strategy	Concrete	Pictorial	Abstract
To subtract numbers with up to three-digits, using formal written methods of columnar subtraction **Column subtraction (without exchanging)**	  Use base 10 or Numicon to model The calculation will be shown alongside the model chosen to see the connection **Model** | **Calculation** 	Children are to be secure with use of PV counters before moving onto abstract. 	When children have secured their understanding of place value through subtraction, they will begin to explore the short column method alongside the pictorial examples. 

Column Subtraction (with exchanging)	Begin with base 10 or Numicon. Move to pv counters, modelling the exchange of a ten into ten ones. **Use the phrase 'take and make' for exchange.** Children always write out their calclation to the side **435 – 273 = 162**  3 1 435 – 273 262  	   	Children may begin to explore the expanded column method for exchanging if they need to deepen their understanding of this concept.  If children have a good grasp of exchanging, they may move straight to the short column method for subtraction. 
Vocabulary	equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is…difference, count on, strategy, partition, exchange, borrow		

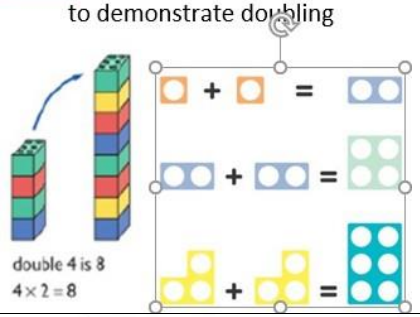
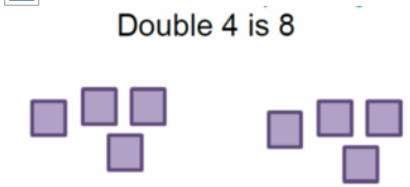
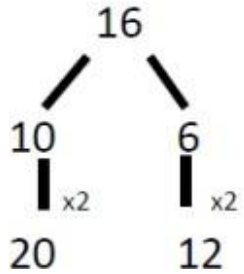
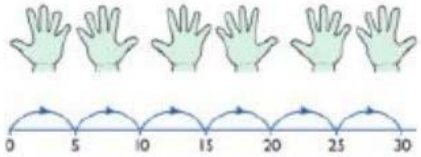
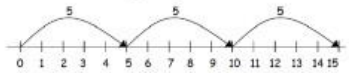
Subtraction - Stage 4

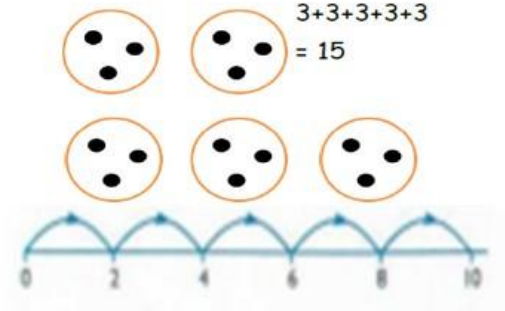
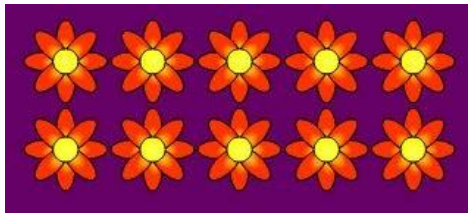
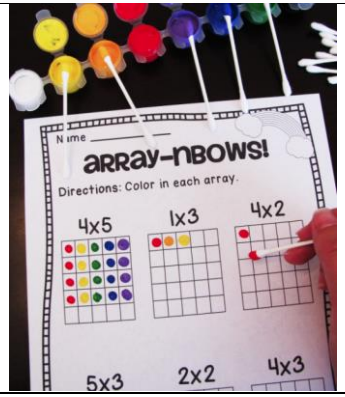
Objective and Strategy	Concrete	Pictorial	Abstract
Subtract numbers with up to 4 digits using the formal written methods appropriate of columnar subtraction where appropriate. **Year 4 subtraction with up to 4 digits**	Model process of exchange using Numicon, base ten and then move to PV counters. Use the phrase 'take and make' for exchange- see Y3 The calculation will be shown alongside the model chosen to see the connection **Model** | **Calculation** 	Children to draw PV counters and show their exchange – see Y3 The calculation will be shown alongside the model; chosen to see the connection **Model** | **Calculation**	This will lead to an understanding of subtracting any number including decimals. 3 1 4357 − 2735 1622
Introduce decimal subtraction through context of money	Children to be encouraged to use counters to represent numbers and take counters away to subtract. 	 When confident, children can find their own way to record the exchange/regrouping	
Vocabulary	equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is…difference, count on, strategy, partition		

Subtraction - Stage 5 and 6

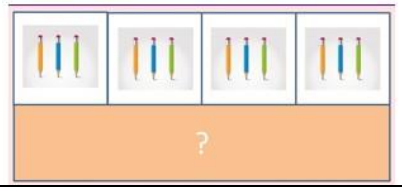
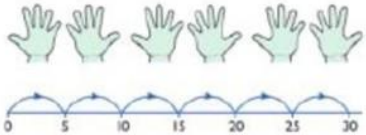
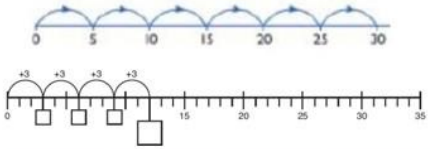
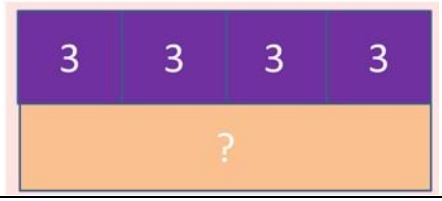
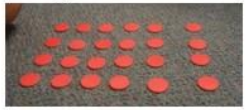
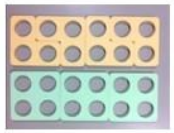
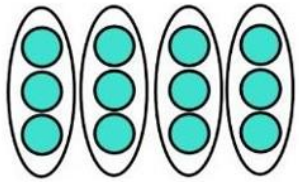
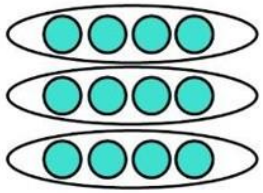
Objective and Strategy	Concrete	Pictorial	Abstract
Subtract with at least 4 digits, including money and measures. **Subtract with increasingly large and more complex numbers and decimal values (up to 3 decimal place).**	**At this stage, children will spend a short time exploring the concrete and pictorial representations, and will spend more time mastering the abstract method using larger numbers.**		
Vocabulary	equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is…difference, count on, strategy, partition, tens units		

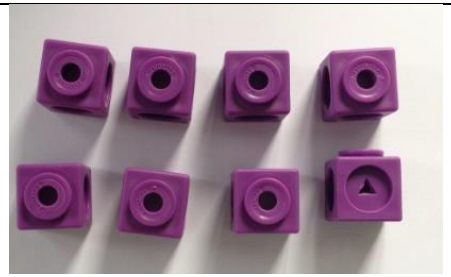
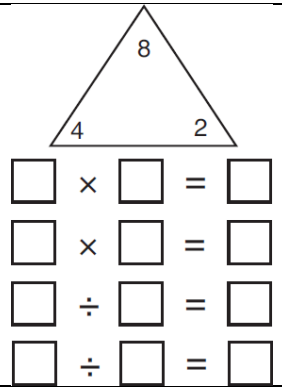
Multiplication - Working at KS1 standards Stage 1

Objective and Strategy	Concrete	Pictorial	Abstract
Doubling	Use practical activities using manip-ultives including cubes and Numicon to demonstrate doubling 	Draw pictures to show how to double numbers 	Partition a number and then double each part before recombining it back together. 
Counting in Multiples	  Count in multiples supported by concrete objects in equal groups.	 Use a number line or pictures to continue support in counting in multiples.	Count in multiples of a number aloud. Write sequences with multiples of numbers. **2, 4, 6, 8, 10** **5, 10, 15, 20, 25, 30**
Repeated addition	 Use different objects to add equal groups.	There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there?  2 add 2 add 2 equals 6  5 + 5 + 5 = 15	Write addition sentences to describe objects and pictures.  2 + 2 + 2 + 2 + 2 = 10

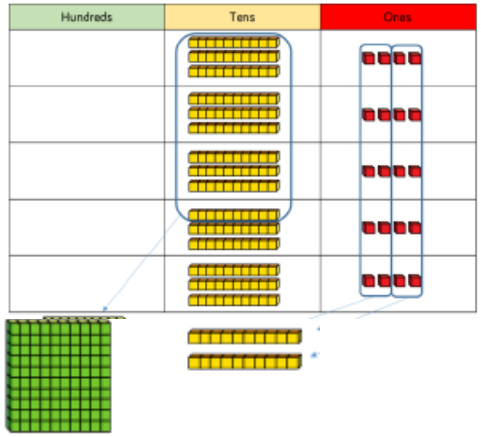
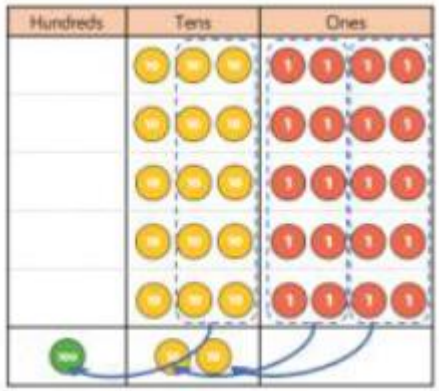
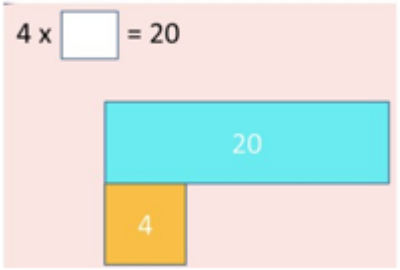
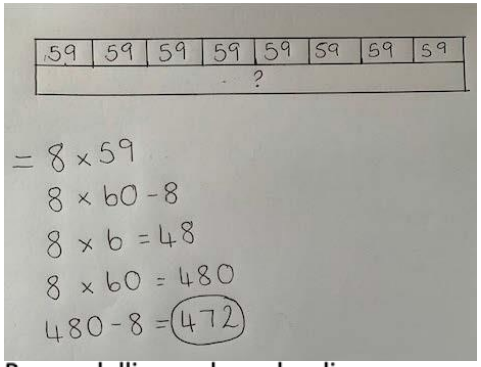
		Use pictorial including number lines to solve problems There are 3 sweets in one bag. How many sweets are in 5 bags altogether? 3+3+3+3+3 = 15  	
Understanding arrays	Use objects laid out in arrays to find the answers to 2 lots 5, 3 lots of 2 etc. 	 	3 x 2 = 6 2 x 5 = 10
Vocabulary	Groups of, lots of, times, array, altogether, multiply		

Multiplication - Working at KS1 standards Stage 2

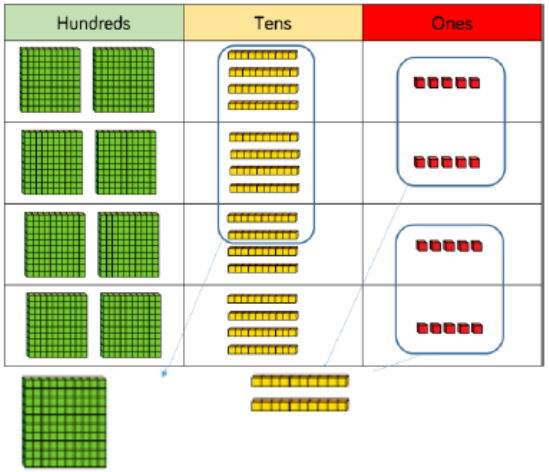
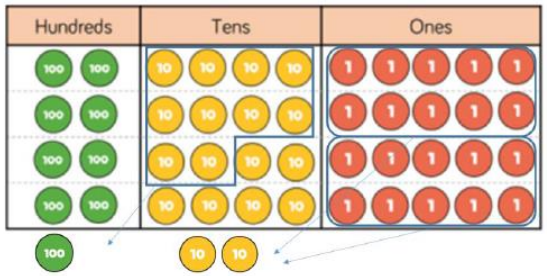
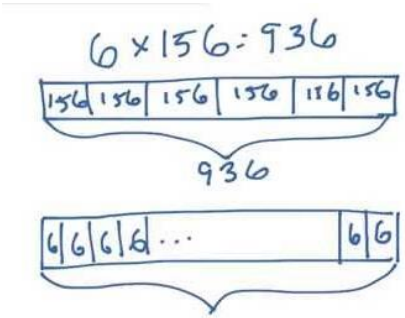
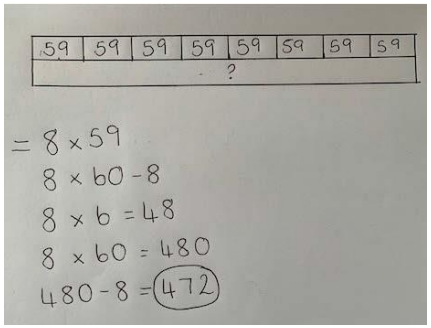
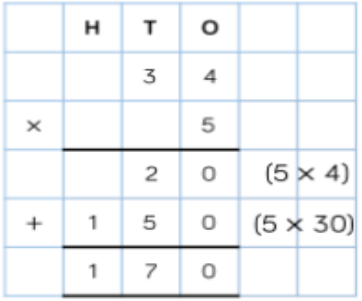
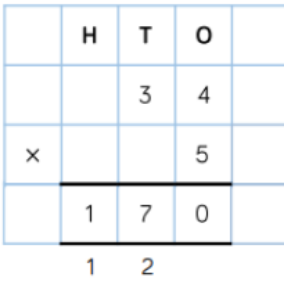
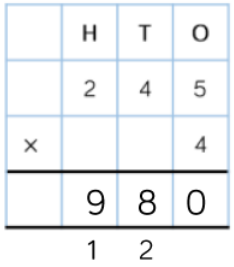
Objective and Strategy	Concrete	Pictorial	Abstract
Counting in multiples of 2, 3, 4, 5, 10 from 0 (repeated addition	Count the groups as children are skip counting, children may use their fingers as they are skip counting. Use bar models.  5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 40  	Number lines, counting sticks and bar models should be used to show representation of counting in multiples.   	Count in multiples of a number aloud. Write sequences with multiples of numbers. 0, 2, 4, 6, 8, 10 0, 3, 6, 9, 12, 15 0, 5, 10, 15, 20, 25 , 30 $4 \times 3 = \square$
Multiplication is commutative	Create arrays using counters and cubes and Numicon.    Pupils should understand that an array can represent different equations and that, as multiplication is commutative, the order of the multiplication does not affect the answer.  	Use representations of arrays to show different calculations and explore commutativity.  	12 = 3 × 4 12 = 4 × 3 Use an array to write multiplication sentences and reinforce repeated addition.  5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15

Using the Inverse **This should be taught alongside division, so pupils learn how they work alongside each other.**			$7\times3=21$ $3\times7=21$ $21\div3=7$ $21\div7=3$
Vocabulary	Groups of, lots of, times, array, altogether, multiply, multiplied by, repeated addition, sets of, equal groups, times as big as, commutative.		

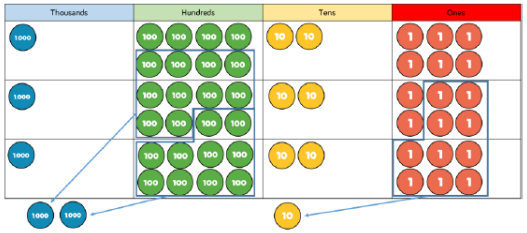
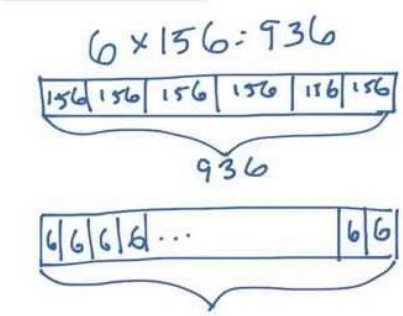
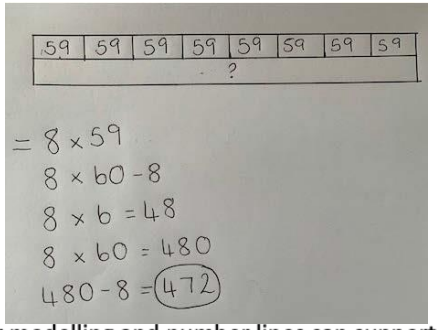
Multiplication- Stage 3

Objective and Strategy	Concrete	Pictorial	Abstract
Multiplying a two digit number by a one digit number **Solving problems including missing number problems, integer scaling problems.**	  **ALWAYS DISPLAY THE CALCULATION BESIDE THE MODEL** **Model** | **Calculation**	Bar model are used to explore missing numbers   Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.	When children have secured their understanding of multiplication through concrete and pictorial representations, they will begin to explore the long column method which reinforces place value and times tables knowledge. H T O 3 4 × 5 2 0 (5 × 4) + 1 5 0 (5 × 30) 1 7 0
Vocabulary	Groups of, lots of, times, array, altogether, multiply, multiplied by, repeated addition, sets of, equal groups, times as big as, commutative, product, multiples of, scale up		

Multiplication- Stage 4

Objective and Strategy	Concrete	Pictorial	Abstract
Multiply two- digit and three-digit numbers by a one-digit number using formal written layout	**FOR THE CALCULATION 245 x 4 = 980**   **ALWAYS DISPLAY THE CALCULATION BESIDE THE MODEL** **Model** | **Calculation**	Children can be encouraged and challenged to find an answer using bar modelling   Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.	Children may continue to explore the expanded column method, particularly if they are not yet secure with their times tables.  When children have a good grasp of this, they will move to the short column method.  
Vocabulary	Groups of, lots of, times, array, altogether, multiply, multiplied by, repeated addition, sets of, equal groups, times as big as, commutative, product, multiples of, scale up, inverse, derive		

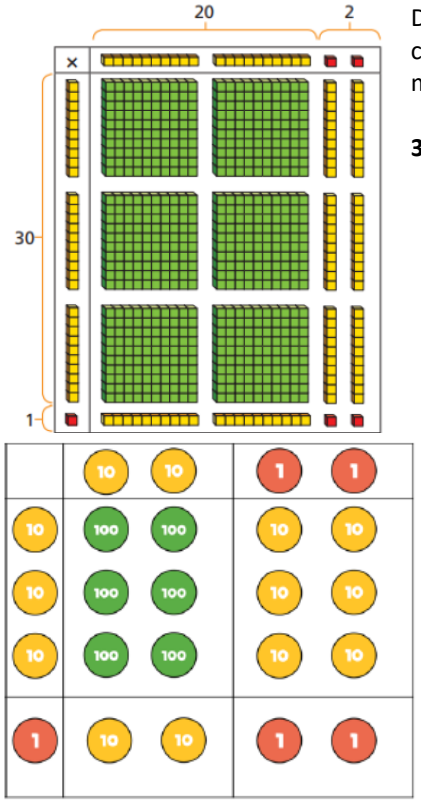
Multiplication- Stage 5

Objective and Strategy	Concrete	Pictorial	Abstract
Multiply numbers up to 4-digits by a one-digit number using the formal written method, including long multiplication for 2-digit numbers **Single digit first**	When multiplying 4-digit numbers, place value counters are the best manipulative to use to support children in their understanding of the formal written method. If children are multiplying larger numbers and struggling with their times tables, encourage the use of multiplication grids so children can focus on the use of the written method.  **1826 X 3 = 5478**	  Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.	$1{,}826 \times 3 = 5{,}478$ |	Th	H	T	O
---	---	---	---	---
	1	8	2	6
×				3
	5	4	7	8
	2		1		 $1{,}826 \times 3 = 5{,}478$

Multiply numbers up to 4-digits by a one-digit number using the formal written method, including long multiplication for 2-digit numbers

Long multiplication 2-digit X 2-digit

When multiplying a multi-digit number by 2-digits, use the area model to help children understand the size of the numbers they are using. This links to finding the area of a rectangle by finding the space covered by the Base 10. The grid method matches the area model as an initial written method before moving on to the formal written multiplication method.

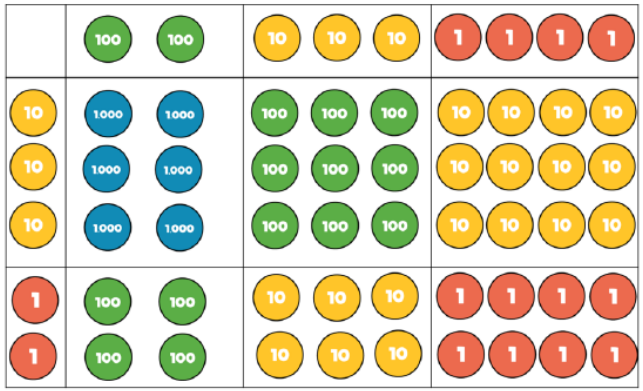
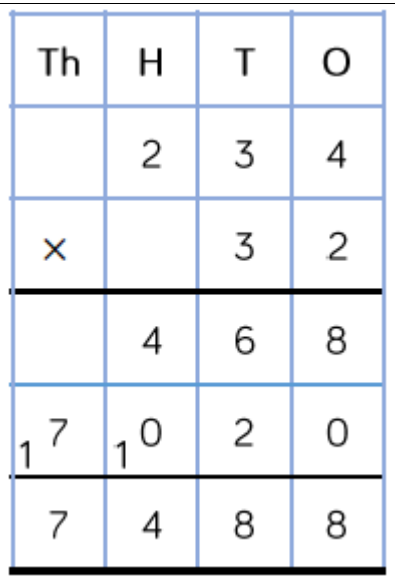


Display the calculation beside the model.

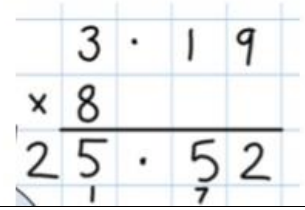
31 X 22 = 682

	H	T	O
		2	2
×		3	1
		2	2
	6	6	0
	6	8	2

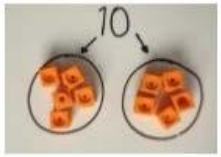
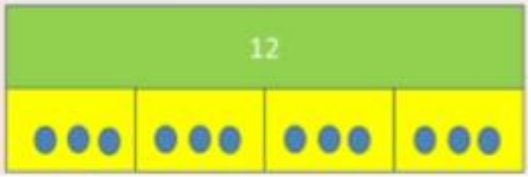
22 X 1 on the first line.
22 X 30 on the second line. Show multiplying by 10 by putting zero (place holder) in the ones first. All whole numbers times 10 or a multiple of 10 end in a zero

Multiply numbers up to 4-digits by a one-digit number using the formal written method, including long multiplication for 2-digit numbers **3-digit X 2-digit**	Children can continue to use the area model when multiplying 3 by 2 digit numbers. PV counters become more efficient to use but Base 10 can be used to highlight the size of the numbers. Encourage children to move towards the formal written method seeing the links with the grid method **234 X 32 = 7488**  		
Vocabulary	Groups of, lots of, times, array, altogether, multiply, multiplied by, repeated addition, sets of, equal groups, times as big as, commutative, product, multiples of, scale up, inverse, derive, factor pairs, composite numbers, prime number, factors, squared, cubed		

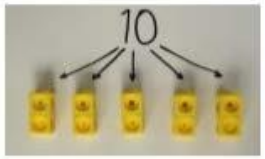
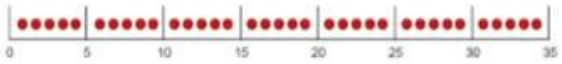
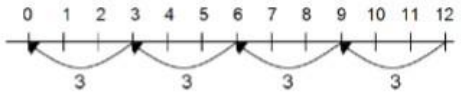
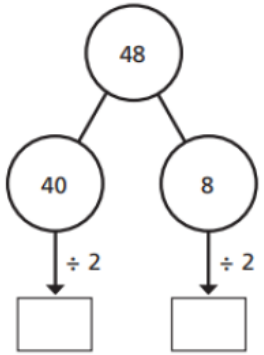
Multiplication- Stage 6

Concrete	Pictorial	Abstract	
Multiply numbers up to 4-digits by a one-digit number using the formal written method, including long multiplication for 2-digit numbers **4-digit X 2-digit**	**When multiplying 4-digits by 2-digits, children should be confident in the written method.** **If they are still struggling with times tables, provide multiplication grids to support when they are focusing on the use of the method.** **Consider where exchanged digits are placed and make sure this is consistent.**		
Multiply decimal up to 2 decimal place by a single digit.			Remind children that the single digit belongs in the units column. Line up the decimal points in the question and the answer. 
Vocabulary	Groups of, lots of, times, array, altogether, multiply, multiplied by, repeated addition, sets of, equal groups, times as big as, commutative, product, multiples of, scale up, inverse, derive, factor pairs, composite numbers, prime number, factors, squared, cubed		

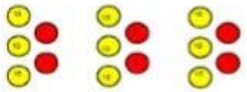
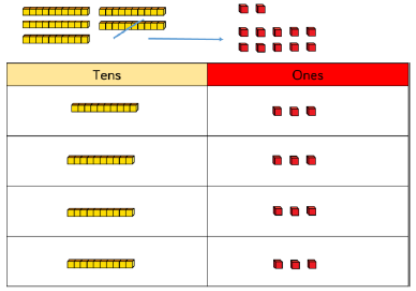
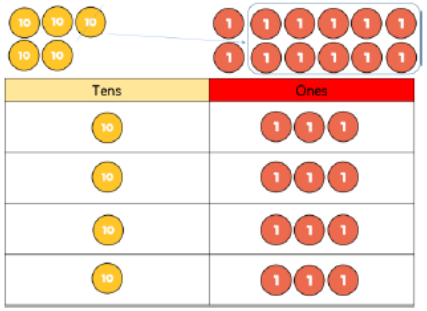
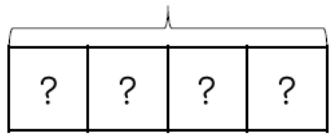
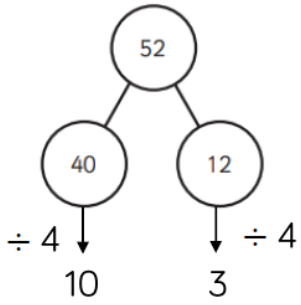
Division - Working at KS1 standards Stage 1

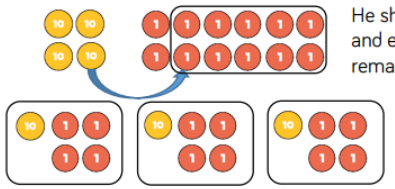
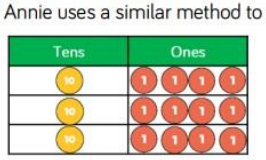
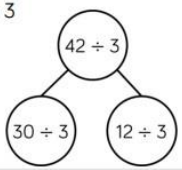
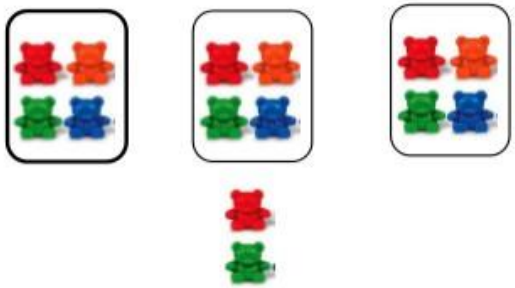
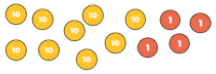
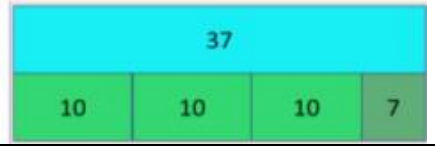
Objective and Strategy	Concrete	Pictorial	Abstract
Division as sharing (sharing objects into groups)	   I have 10 cubes, can you share them equally in 2 groups?	Children use pictures or shapes to share quantities.  $8 \div 2 = 4$ Children use bar modelling to show and support understanding.  $12 \div 4 = 3$	**Share 9 buns between three people.** **$9 \div 3 = 3$**
Vocabulary	share, share equally, one each, two each…, group, groups of, lots of, array		

Division - Working at KS1 standards Stage 2

Objective and Strategy	Concrete	Pictorial	Abstract
Division as grouping	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.  96 ÷ 3 = 32   	Use a number line to show jumps in groups. The number of jumps equals the number of groups.  Think of the bar as a whole. Split it into the number of groups you ar dividing by and work out how many would be within each group.  20 ÷ 5 = ? 5 x ? = 20  48 ÷ 2 = 24	**Share 30 with 5 people, how many does each person get?**
Vocabulary	share, share equally, one each, two each…, group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over		

Division- Stage 3

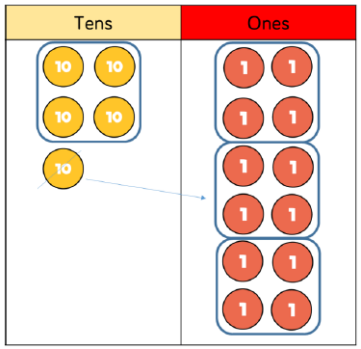
Objective and Strategy	Concrete	Pictorial	Abstract
Division as grouping	Use cubes, counters, objects or place value counters to aid understanding.  24 divided into groups of 6 = 4 96 ÷ 3 = 32 	Continue to use bar modelling to aid solving division problems.  20 ÷ 5 = ? 5 x ? = 20	**How many groups of 3 are in 48?**
Divide 2 digits by 1 digit (sharing with exchange) **No remainders**	  52 ÷ 4 = 13	52  52 ÷ 4 = 13  10 + 3 = 13	**Share 52 between 4 people, how many does each person get?** 96 ÷ 8 96 ÷ 4 96 ÷ 3 96 ÷ 6 Compare the statements using <, > or = 48 ÷ 4 ◯ 36 ÷ 3 52 ÷ 4 ◯ 42 ÷ 3 60 ÷ 3 ◯ 60 ÷ 4

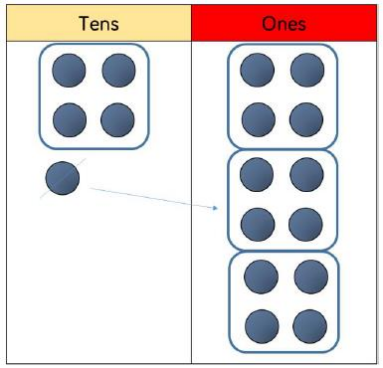
	Ron uses place value counters to divide 42 into three equal groups.  He shares the tens first and exchanges the remaining ten for ones. Then he shares the ones. 42 ÷ 3 = 14	Annie uses a similar method to divide 42 by 3   Children may use pictorial representation for the PV counters, alongside the part-whole model Children use their times-tables to partition the number into multiples of the divisor.	
Divide 2 digits by 1 digit (sharing with remainders)	**14 ÷ 3 =** Divide objects between groups and see how much is left over  Moving on to: Use place value counters to work out 94 ÷ 4 Did you need to exchange any tens for ones? Is there a remainder?  29	53 13 | 13 | 13 | 13 | 1 **53 ÷ 4 = 13 r1** Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.  Draw dots and group them to divide an amount and clearly show a remainder.  Use bar models to show division with remainders.  	Complete written divisions and show the remainder using r. 29 ÷ 8 = 3 REMAINDER 5 dividend divisor quotient remainder
Vocabulary	share, share equally, one each, two each…, group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, product		

Division- Stage 4

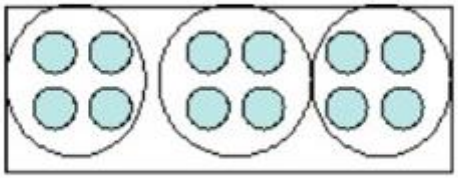
Divide 2 digits by 1 digit (grouping)

For the calculation 52 divided by 4

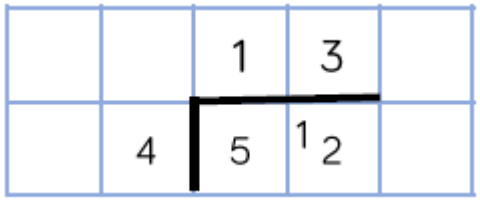




Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.

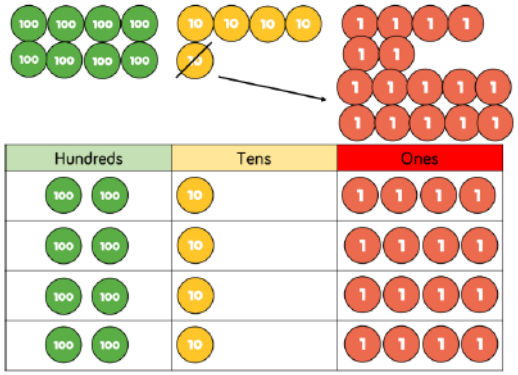


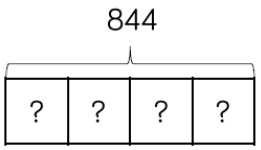
Encourage them to move towards counting in multiples to divide more efficiently.

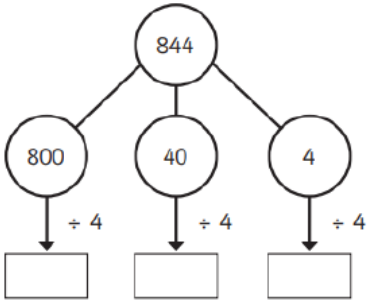


Divide 3 digits by 1 digit (sharing)

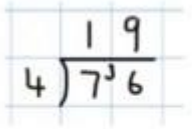
For the calculation 844 divided by 4

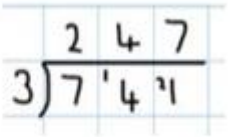




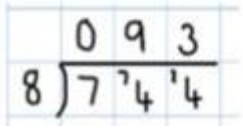


Begin with divisions that divide equally with no remainder

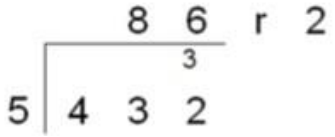




Children should be aware that a 0 is used to keep place value, if the number is not divisible.



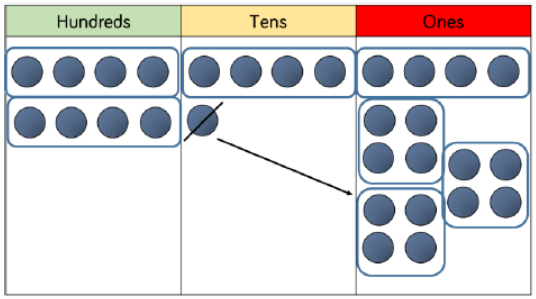
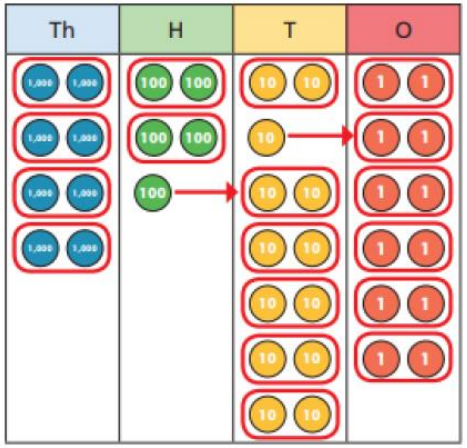
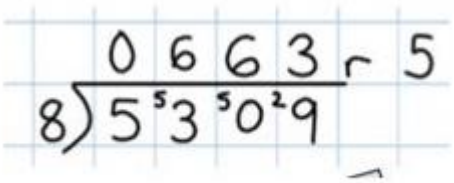
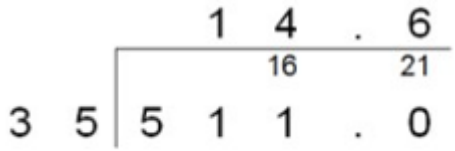
Move onto divisions with a remainder.



Vocabulary

share, share equally, one each, two each…, group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, product, division facts, inverse, derive

Division- Stage 5

Objective and Strategy	Concrete	Pictorial	Abstract
Divide at least 4 digit numbers by 1 digit. **Interpret remainders appropriately for the context** **Short Division**	 $856 \div 4 = 214$  $8{,}532 \div 2 = 4{,}266$	**Children can continue to use grouping to support their understanding of short division when dividing a 3 or 4 digit number by a 1 digit number**	  Extend: Finally move into decimal places to divide the total accurately. 
Vocabulary	share, share equally, one each, two each…, group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, product, division facts, inverse, derive, formal written method.		

Division- Stage 6

Objective and Strategy	Concrete Pictorial	Abstract
Long division	**When children begin to divide up to 4 digits by 2 digits, written methods become the most accurate as concrete and pictorial methods become less effective.** **Children can write out multiples to support with larger remainders.** **Children will also solve problems with remainders where the quotient can be rounded as appropriate.**